SEQUENCE LISTING

<110> AKZO Nobel N.V.

<120> novel *Brachyspira hyodysenteriae* vaccine

<130> Bhyovaccine

<160> 4

<170> PatentIn version 3.1

<210> 1

<211> 1614

<212> DNA

<213> Brachyspira hyodysenteria

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<221> CDS

<222> (1)..(1611)

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Met Lys Lys Leu Tyr Ser Leu Phe Ile Phe Ile Ala Val Ile Leu Phe
1               5                   10                  15

att tat tca tgc gga agt tat ttt aat cct aaa tac tat ttt ttt aaa      96
Ile Tyr Ser Cys Gly Ser Tyr Phe Asn Pro Lys Tyr Tyr Phe Phe Lys
                20                  25                  30

agt aaa gta gag aat aat gga agt tct gga agc tca ggc ggt aat tca     144
Ser Lys Val Glu Asn Asn Gly Ser Ser Gly Ser Ser Gly Gly Asn Ser
            35                  40                  45
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gga ata tat ata cag cct ggt gaa gat gaa gat cct ttt aca gca cct        192
Gly Ile Tyr Ile Gln Pro Gly Glu Asp Glu Asp Pro Phe Thr Ala Pro
    50              55                  60

aaa tat gca tct gag tgg tgg aat gat cct aat aat ggt gga ttt gat        240
Lys Tyr Ala Ser Glu Trp Trp Asn Asp Pro Asn Asn Gly Gly Phe Asp
65              70                  75                  80

gct tcg gat ata gat aaa tgg ttt ttg aaa gtt gaa ttt tta gca aat        288
Ala Ser Asp Ile Asp Lys Trp Phe Leu Lys Val Glu Phe Leu Ala Asn
                85                  90                  95

gat tat cca agt tac aga ttt tta aca aaa agc gga aga aaa gca gga        336
Asp Tyr Pro Ser Tyr Arg Phe Leu Thr Lys Ser Gly Arg Lys Ala Gly
            100                 105                 110

cat gtt tgg gta gtt tct aat gaa caa tct cag gca tat tta gat caa        384
His Val Trp Val Val Ser Asn Glu Gln Ser Gln Ala Tyr Leu Asp Gln
        115                 120                 125

gga gaa gta tgc aat act aca gca gtt acc ggg gta tct ata aaa cca        432
Gly Glu Val Cys Asn Thr Thr Ala Val Thr Gly Val Ser Ile Lys Pro
    130                 135                 140

gta gca aat gta aca gga gta aca tat aca aaa tat aag gga ttg aat        480
Val Ala Asn Val Thr Gly Val Thr Tyr Thr Lys Tyr Lys Gly Leu Asn
145                 150                 155                 160

gca aga ttt ttc act cat gac gga gat tat cat aat gta tat cct gga        528
Ala Arg Phe Phe Thr His Asp Gly Asp Tyr His Asn Val Tyr Pro Gly
                165                 170                 175

aaa gat aag ata agc aga ttc tat ttt tat tat ttt aca ggt act ccg        576
Lys Asp Lys Ile Ser Arg Phe Tyr Phe Tyr Tyr Phe Thr Gly Thr Pro
            180                 185                 190

gaa atg gct aaa ttt tta gaa aat tgc tta ata gct gta gac aca tac        624
Glu Met Ala Lys Phe Leu Glu Asn Cys Leu Ile Ala Val Asp Thr Tyr
        195                 200                 205

tca aaa cta tta ttt tac tat gga aga cct caa agc gat tat cca aat        672
Ser Lys Leu Leu Phe Tyr Tyr Gly Arg Pro Gln Ser Asp Tyr Pro Asn
    210                 215                 220

cct cca agc tgg cag aag cct agt aat ttg gtt gat aaa tac tct cct        720
Pro Pro Ser Trp Gln Lys Pro Ser Asn Leu Val Asp Lys Tyr Ser Pro
225                 230                 235                 240

aca ggt tat tgg ata tct ata gat gaa ggt ata aat gat aag ggg cag        768
Thr Gly Tyr Trp Ile Ser Ile Asp Glu Gly Ile Asn Asp Lys Gly Gln
                245                 250                 255

aat tat cct ttt tat gaa tat gat cct gta gga tat gta aaa agc gat        816
Asn Tyr Pro Phe Tyr Glu Tyr Asp Pro Val Gly Tyr Val Lys Ser Asp
            260                 265                 270

ggt aca gtt gtt ata ttt gat tgg ttt gca aac aga tta aga gga aat        864
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        Gly Thr Val Val Ile Phe Asp Trp Phe Ala Asn Arg Leu Arg Gly Asn
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cat aat aat gat cct ata aaa agt gat cct aaa gga gct att gtt cct    912
His Asn Asn Asp Pro Ile Lys Ser Asp Pro Lys Gly Ala Ile Val Pro
    290             295             300

aat cct aat act aat cct tct gct tca act aca gga cgt tct cct tat    960
Asn Pro Asn Thr Asn Pro Ser Ala Ser Thr Thr Gly Arg Ser Pro Tyr
305             310             315             320

gca ttc tat tcg cct tta gca caa aaa gat aaa act aaa ata act ata  1008
Ala Phe Tyr Ser Pro Leu Ala Gln Lys Asp Lys Thr Lys Ile Thr Ile
                325             330             335

agt act aca aaa tta ata aat tat aca gtt ttc agt tat aaa tac agt  1056
Ser Thr Thr Lys Leu Ile Asn Tyr Thr Val Phe Ser Tyr Lys Tyr Ser
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ata caa ata ttt ccg cct agt atg aaa gaa gaa aaa ctt cct tat gct  1104
Ile Gln Ile Phe Pro Pro Ser Met Lys Glu Glu Lys Leu Pro Tyr Ala
            355             360             365

tat att gca tat gct tcc tat ggt gca gct tat caa aat gaa agc agc  1152
Tyr Ile Ala Tyr Ala Ser Tyr Gly Ala Ala Tyr Gln Asn Glu Ser Ser
    370             375             380

aaa tct gta gag atg ata tct gat ata aat aaa gga gag cat tac gga  1200
Lys Ser Val Glu Met Ile Ser Asp Ile Asn Lys Gly Glu His Tyr Gly
385             390             395             400

agt att aca aga ata agc act gta cct aaa ata gat aaa gac gga gga  1248
Ser Ile Thr Arg Ile Ser Thr Val Pro Lys Ile Asp Lys Asp Gly Gly
                405             410             415

gag ttg gta aaa gaa gga tct aag tct ttt gaa tta tat ggt att gat  1296
Glu Leu Val Lys Glu Gly Ser Lys Ser Phe Glu Leu Tyr Gly Ile Asp
                420             425             430

act aaa gat aca ttt ata gaa tta agt tta aaa cta att aaa aat gat  1344
Thr Lys Asp Thr Phe Ile Glu Leu Ser Leu Lys Leu Ile Lys Asn Asp
        435             440             445

gaa aat aca gaa ttt gtt gat caa gga aca gca ggt act ggt cct tta  1392
Glu Asn Thr Glu Phe Val Asp Gln Gly Thr Ala Gly Thr Gly Pro Leu
    450             455             460

gta tac ttt gat aaa aca gat cct ata ctt gta tta aaa tat gat aaa  1440
Val Tyr Phe Asp Lys Thr Asp Pro Ile Leu Val Leu Lys Tyr Asp Lys
465             470             475             480

tct tct gac agc ttc aaa tac agc agt gta aaa gga aac aag caa ata  1488
Ser Ser Asp Ser Phe Lys Tyr Ser Ser Val Lys Gly Asn Lys Gln Ile
                485             490             495

gaa gtt gac agc aat tta tca att aaa aga gga gag aat aaa gag ttt  1536
Glu Val Asp Ser Asn Leu Ser Ile Lys Arg Gly Glu Asn Lys Glu Phe
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                500                   505                    510
aca gtt aaa ttt aaa gat cca aat aat gga aat gag ttt ggg gtt gta      1584
Thr Val Lys Phe Lys Asp Pro Asn Asn Gly Asn Glu Phe Gly Val Val
        515                   520                   525

ttt aaa ata gat ttt gaa aaa ata tca tga                              1614
Phe Lys Ile Asp Phe Glu Lys Ile Ser
        530                   535
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<211> 537

<212> PRT

<213> Brachyspira hyodysenteria

<400> 2

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            20                  25                  30


Ser Lys Val Glu Asn Asn Gly Ser Ser Gly Ser Ser Gly Gly Asn Ser
        35                  40                  45


Gly Ile Tyr Ile Gln Pro Gly Glu Asp Glu Asp Pro Phe Thr Ala Pro
    50                  55                  60


Lys Tyr Ala Ser Glu Trp Trp Asn Asp Pro Asn Asn Gly Gly Phe Asp
65                  70                  75                  80


Ala Ser Asp Ile Asp Lys Trp Phe Leu Lys Val Glu Phe Leu Ala Asn
                85                  90                  95


Asp Tyr Pro Ser Tyr Arg Phe Leu Thr Lys Ser Gly Arg Lys Ala Gly
            100                 105                 110


His Val Trp Val Val Ser Asn Glu Gln Ser Gln Ala Tyr Leu Asp Gln
            115                 120                 125


Gly Glu Val Cys Asn Thr Thr Ala Val Thr Gly Val Ser Ile Lys Pro
    130                 135                 140
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Val Ala Asn Val Thr Gly Val Thr Tyr Thr Lys Tyr Lys Gly Leu Asn
145             150             155             160


Ala Arg Phe Phe Thr His Asp Gly Asp Tyr His Asn Val Tyr Pro Gly
                165             170             175


Lys Asp Lys Ile Ser Arg Phe Tyr Phe Tyr Tyr Phe Thr Gly Thr Pro
            180             185             190


Glu Met Ala Lys Phe Leu Glu Asn Cys Leu Ile Ala Val Asp Thr Tyr
        195             200             205


Ser Lys Leu Leu Phe Tyr Tyr Gly Arg Pro Gln Ser Asp Tyr Pro Asn
    210             215             220


Pro Pro Ser Trp Gln Lys Pro Ser Asn Leu Val Asp Lys Tyr Ser Pro
225             230             235             240


Thr Gly Tyr Trp Ile Ser Ile Asp Glu Gly Ile Asn Asp Lys Gly Gln
            245             250             255


Asn Tyr Pro Phe Tyr Glu Tyr Asp Pro Val Gly Tyr Val Lys Ser Asp
            260             265             270


Gly Thr Val Val Ile Phe Asp Trp Phe Ala Asn Arg Leu Arg Gly Asn
    275             280             285


His Asn Asn Asp Pro Ile Lys Ser Asp Pro Lys Gly Ala Ile Val Pro
    290             295             300


Asn Pro Asn Thr Asn Pro Ser Ala Ser Thr Thr Gly Arg Ser Pro Tyr
305             310             315             320


Ala Phe Tyr Ser Pro Leu Ala Gln Lys Asp Lys Thr Lys Ile Thr Ile
            325             330             335


Ser Thr Thr Lys Leu Ile Asn Tyr Thr Val Phe Ser Tyr Lys Tyr Ser
        340             345             350


Ile Gln Ile Phe Pro Pro Ser Met Lys Glu Glu Lys Leu Pro Tyr Ala
        355             360             365
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Tyr Ile Ala Tyr Ala Ser Tyr Gly Ala Ala Tyr Gln Asn Glu Ser Ser
    370             375             380

Lys Ser Val Glu Met Ile Ser Asp Ile Asn Lys Gly Glu His Tyr Gly
385             390             395             400

Ser Ile Thr Arg Ile Ser Thr Val Pro Lys Ile Asp Lys Asp Gly Gly
            405             410             415

Glu Leu Val Lys Glu Gly Ser Lys Ser Phe Glu Leu Tyr Gly Ile Asp
            420             425             430

Thr Lys Asp Thr Phe Ile Glu Leu Ser Leu Lys Leu Ile Lys Asn Asp
        435             440             445

Glu Asn Thr Glu Phe Val Asp Gln Gly Thr Ala Gly Thr Gly Pro Leu
    450             455             460

Val Tyr Phe Asp Lys Thr Asp Pro Ile Leu Val Leu Lys Tyr Asp Lys
465             470             475             480

Ser Ser Asp Ser Phe Lys Tyr Ser Ser Val Lys Gly Asn Lys Gln Ile
            485             490             495

Glu Val Asp Ser Asn Leu Ser Ile Lys Arg Gly Glu Asn Lys Glu Phe
            500             505             510

Thr Val Lys Phe Lys Asp Pro Asn Asn Gly Asn Glu Phe Gly Val Val
        515             520             525

Phe Lys Ile Asp Phe Glu Lys Ile Ser
    530             535
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<212>   DNA

<213>   Brachyspira hyodysenteria

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Met Phe Lys Lys Leu Phe Ile Val Val Gly Leu Met Ser Val Leu Ala
1               5                   10                  15

gga tgt gaa act atg cag cct aaa aat aat gat aca att gta aaa aat       96
Gly Cys Glu Thr Met Gln Pro Lys Asn Asn Asp Thr Ile Val Lys Asn
                20                  25                  30

gat aat tca tct aat gaa gat aaa aaa gaa gaa act ata act aga gaa      144
Asp Asn Ser Ser Asn Glu Asp Lys Lys Glu Glu Thr Ile Thr Arg Glu
            35                  40                  45

gat aca cca aaa atg aaa gtt aca gtt tat gga gca gat aaa gaa att      192
Asp Thr Pro Lys Met Lys Val Thr Val Tyr Gly Ala Asp Lys Glu Ile
        50                  55                  60

caa gct gtg gaa ata aat gat aaa act tat tat gta ata ggc gga aaa      240
Gln Ala Val Glu Ile Asn Asp Lys Thr Tyr Tyr Val Ile Gly Gly Lys
65                  70                  75                  80

gat gtt gag aat atg aca gaa gct gat ata aaa aaa tca tct tta gta      288
Asp Val Glu Asn Met Thr Glu Ala Asp Ile Lys Lys Ser Ser Leu Val
                85                  90                  95

gca cct tta aaa gtt aca gaa gaa act gtt aat ggt aca aga ggt ata      336
Ala Pro Leu Lys Val Thr Glu Glu Thr Val Asn Gly Thr Arg Gly Ile
            100                 105                 110

gtt gtt aca tat tat gat gta aaa gta ttc ttg ggt aaa aga aca gga      384
Val Val Thr Tyr Tyr Asp Val Lys Val Phe Leu Gly Lys Arg Thr Gly
            115                 120                 125

aca gga act atc gta gga ata ttc gag cct cag aaa aat gat tgg act      432
Thr Gly Thr Ile Val Gly Ile Phe Glu Pro Gln Lys Asn Asp Trp Thr
        130                 135                 140

aca gga aat gat ttg gat aga agt tta tct att caa ata aaa tta tct      480
Thr Gly Asn Asp Leu Asp Arg Ser Leu Ser Ile Gln Ile Lys Leu Ser
145                 150                 155                 160

aga aat ata gca ggt cct ata gat ata aaa aga gga agc ata tct tta      528
Arg Asn Ile Ala Gly Pro Ile Asp Ile Lys Arg Gly Ser Ile Ser Leu
                165                 170                 175

gca ttt aat taa                                                      540
Ala Phe Asn
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            20   25   30

Asp Asn Ser Ser Asn Glu Asp Lys Lys Glu Glu Thr Ile Thr Arg Glu
        35   40   45

Asp Thr Pro Lys Met Lys Val Thr Val Tyr Gly Ala Asp Lys Glu Ile
    50   55   60

Gln Ala Val Glu Ile Asn Asp Lys Thr Tyr Tyr Val Ile Gly Gly Lys
65   70   75   80

Asp Val Glu Asn Met Thr Glu Ala Asp Ile Lys Lys Ser Ser Leu Val
                85   90   95

Ala Pro Leu Lys Val Thr Glu Glu Thr Val Asn Gly Thr Arg Gly Ile
            100   105   110

Val Val Thr Tyr Tyr Asp Val Lys Val Phe Leu Gly Lys Arg Thr Gly
        115   120   125

Thr Gly Thr Ile Val Gly Ile Phe Glu Pro Gln Lys Asn Asp Trp Thr
    130   135   140

Thr Gly Asn Asp Leu Asp Arg Ser Leu Ser Ile Gln Ile Lys Leu Ser
145   150   155   160

Arg Asn Ile Ala Gly Pro Ile Asp Ile Lys Arg Gly Ser Ile Ser Leu
                165   170   175

Ala Phe Asn